FIG. 1

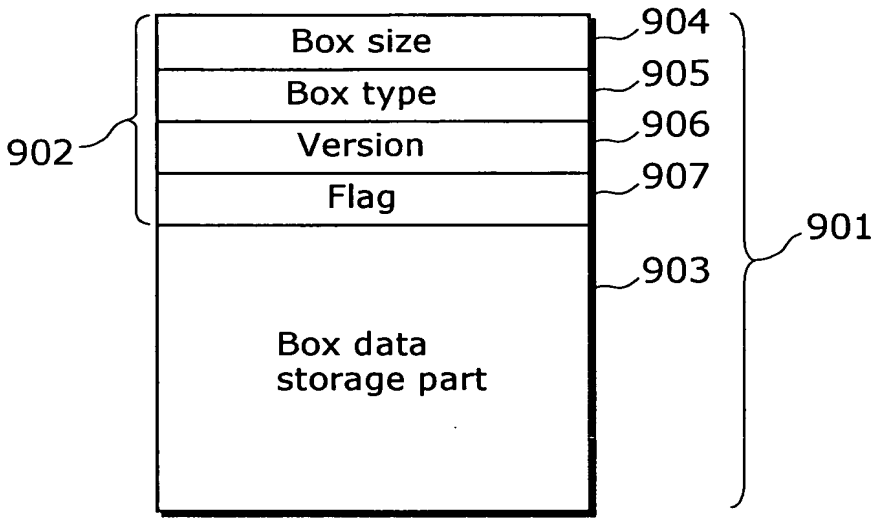

Box size
Box type
Version
Flag
Box data storage part
902
904
905
906
907
903
901

FIG. 2

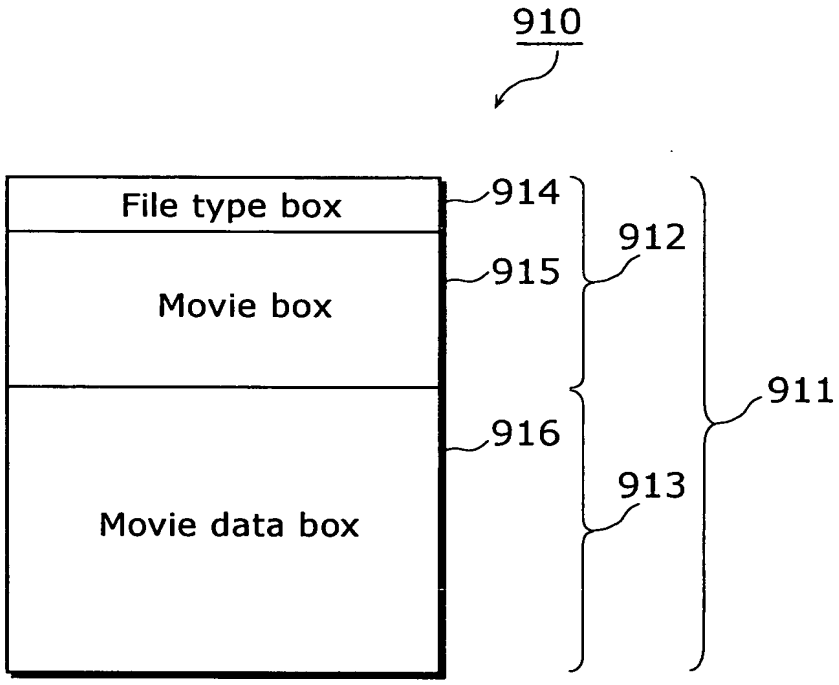

910
File type box
Movie box
Movie data box
914
915
916
912
913
911

FIG. 3A

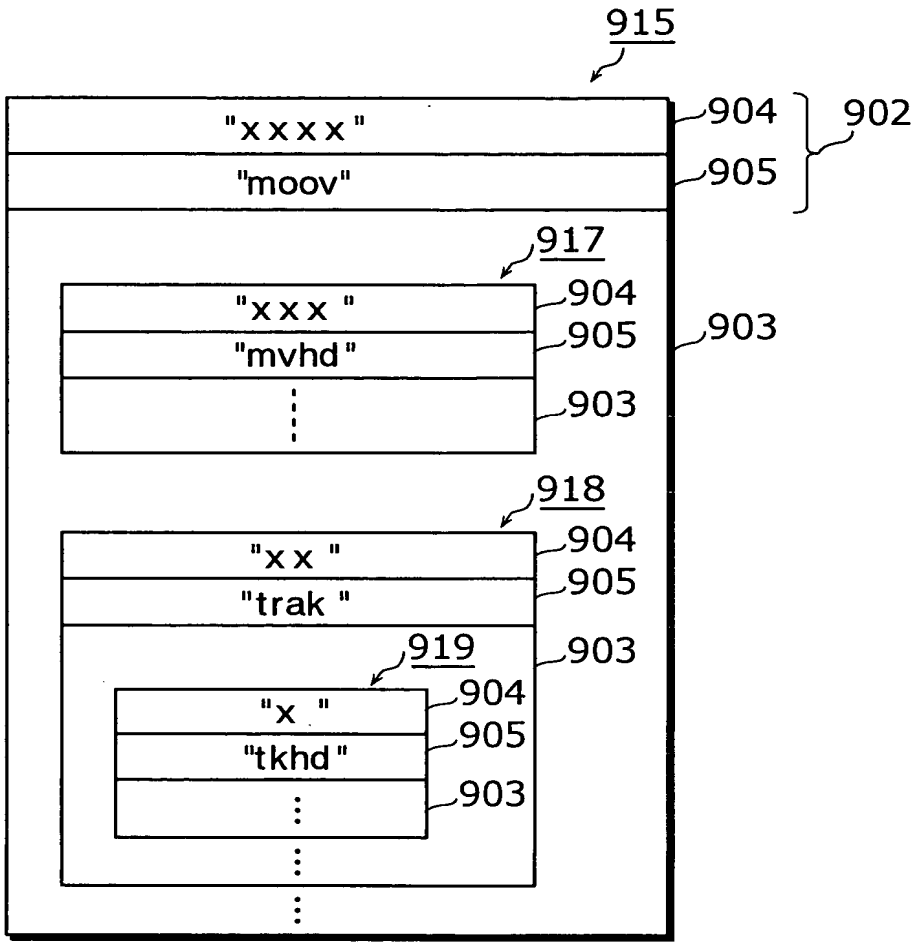

915
"xxxx"
"moov"
904
905
902
917
"xxx "
"mvhd"
904
905
903
903
918
"xx "
"trak "
904
905
919
903
"x "
"tkhd"
904
905
903

FIG. 3B

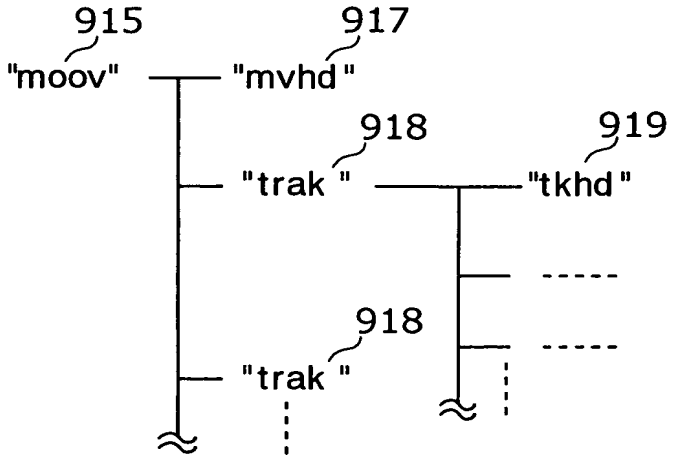

915
"moov"
917
"mvhd"
918
"trak"
919
"tkhd"
918
"trak"

FIG. 4

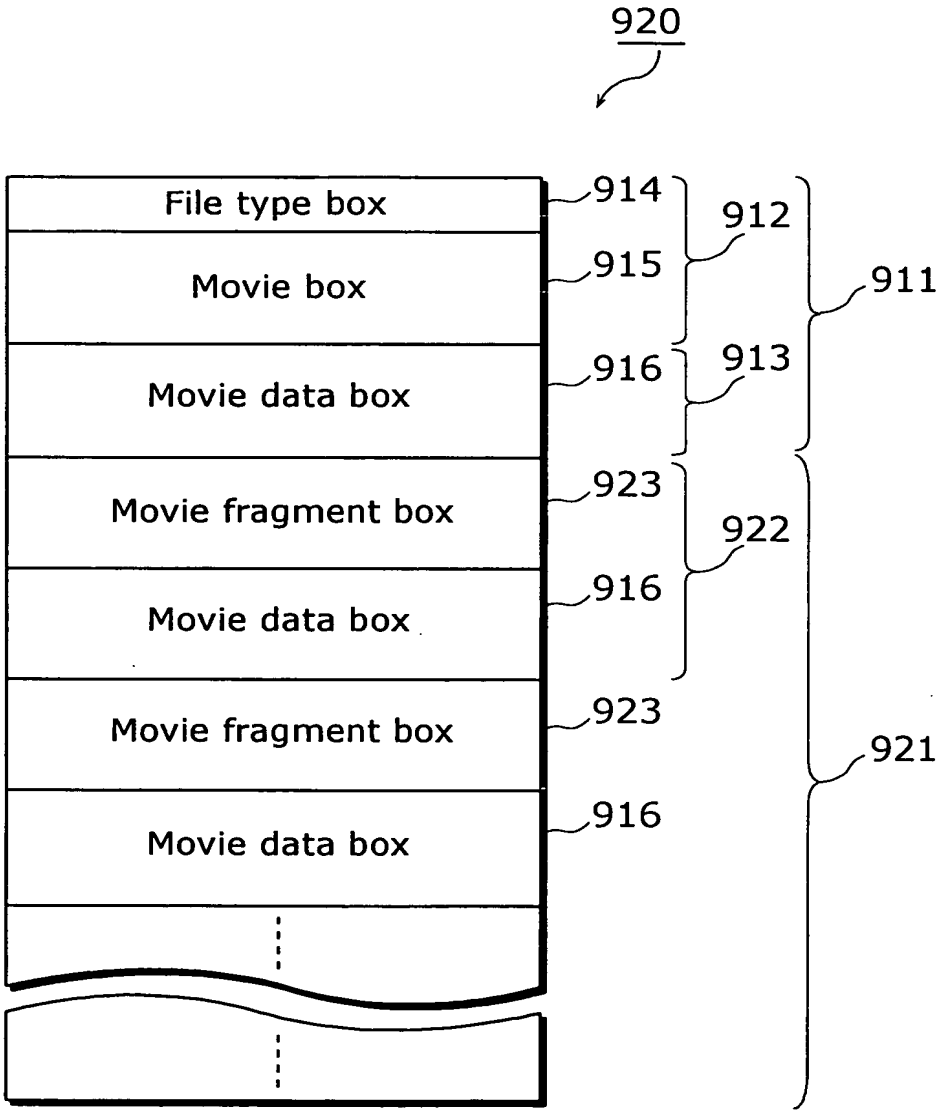

920
File type box
Movie box
Movie data box
Movie fragment box
Movie data box
Movie fragment box
Movie data box
914
915
916
923
916
923
916
912
913
922
911
921

FIG. 5

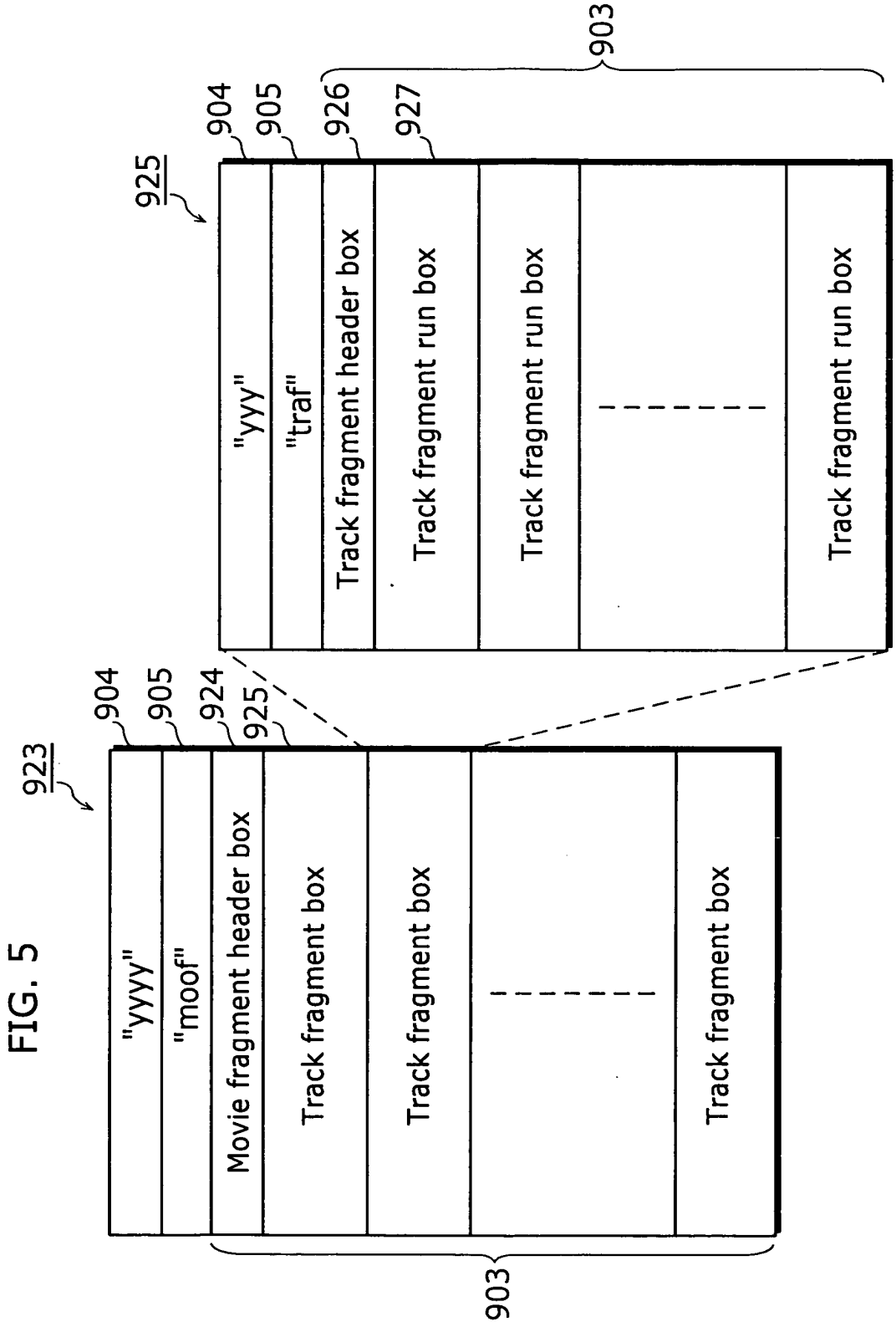

923
904
905
924
925
"yyyy"
"moof"
Movie fragment header box
Track fragment box
Track fragment box
Track fragment box
903
925
904
905
926
927
"yyy"
"traf"
Track fragment header box
Track fragment run box
Track fragment run box
Track fragment run box
903

FIG. 6

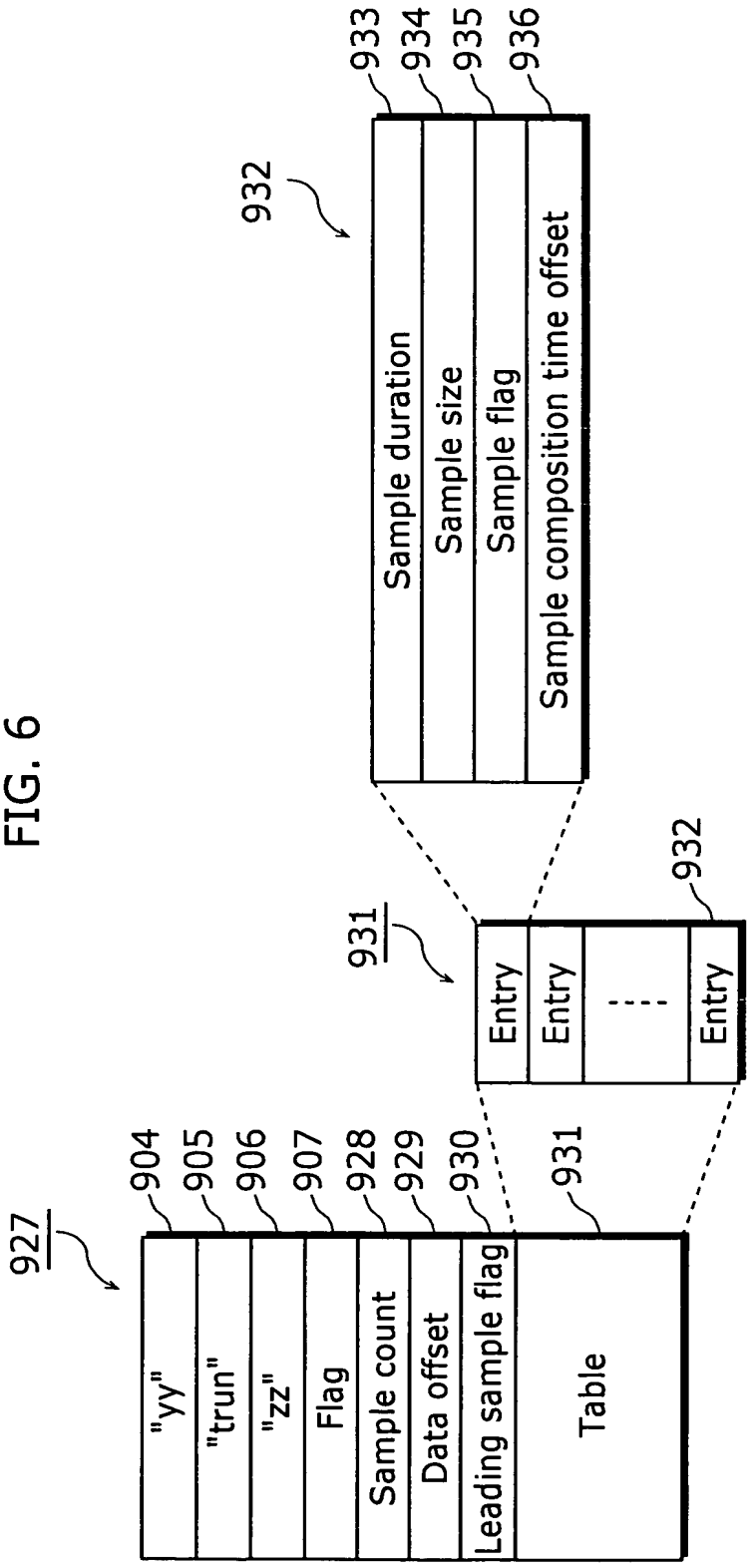

927
904
905
906
907
928
929
930
931
"yy"
"trun"
"zz"
Flag
Sample count
Data offset
Leading sample flag
Table
931
932
Entry
Entry
Entry
932
933
934
935
936
Sample duration
Sample size
Sample flag
Sample composition time offset

FIG. 7B

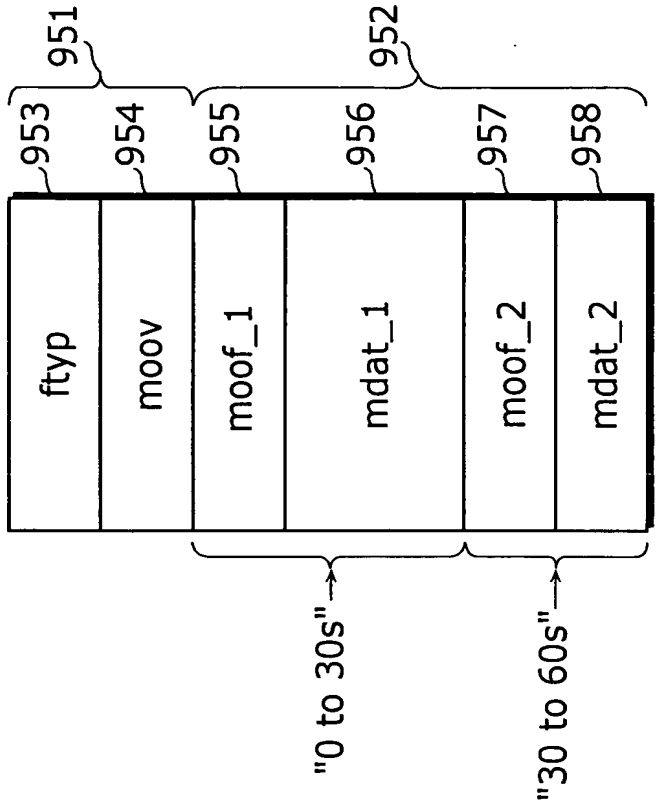

950
951
952
953
954
955
956
957
958
ftyp
moov
moof_1
mdat_1
moof_2
mdat_2
"0 to 30s"
"30 to 60s"

FIG. 7A

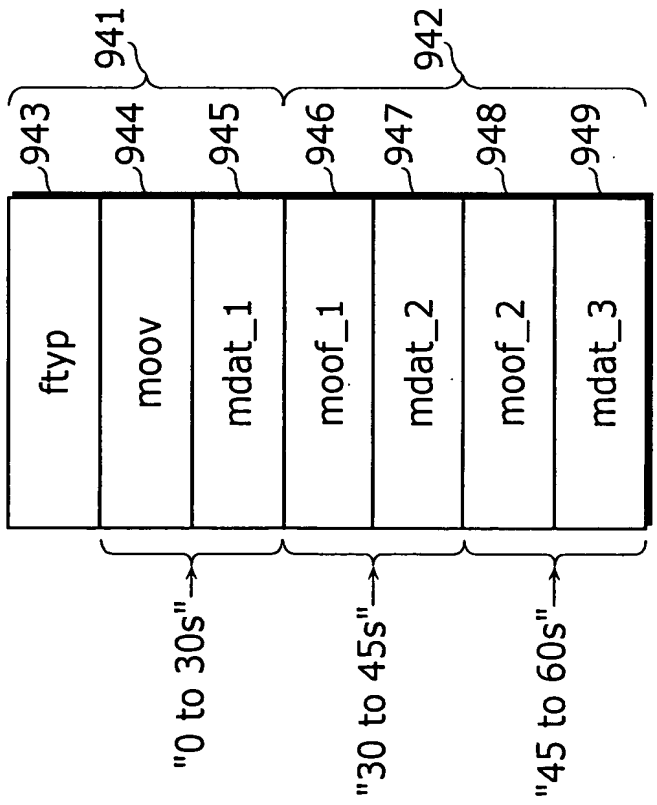

940
941
942
943
944
945
946
947
948
949
ftyp
moov
mdat_1
moof_1
mdat_2
moof_2
mdat_3
"0 to 30s"
"30 to 45s"
"45 to 60s"

FIG. 8

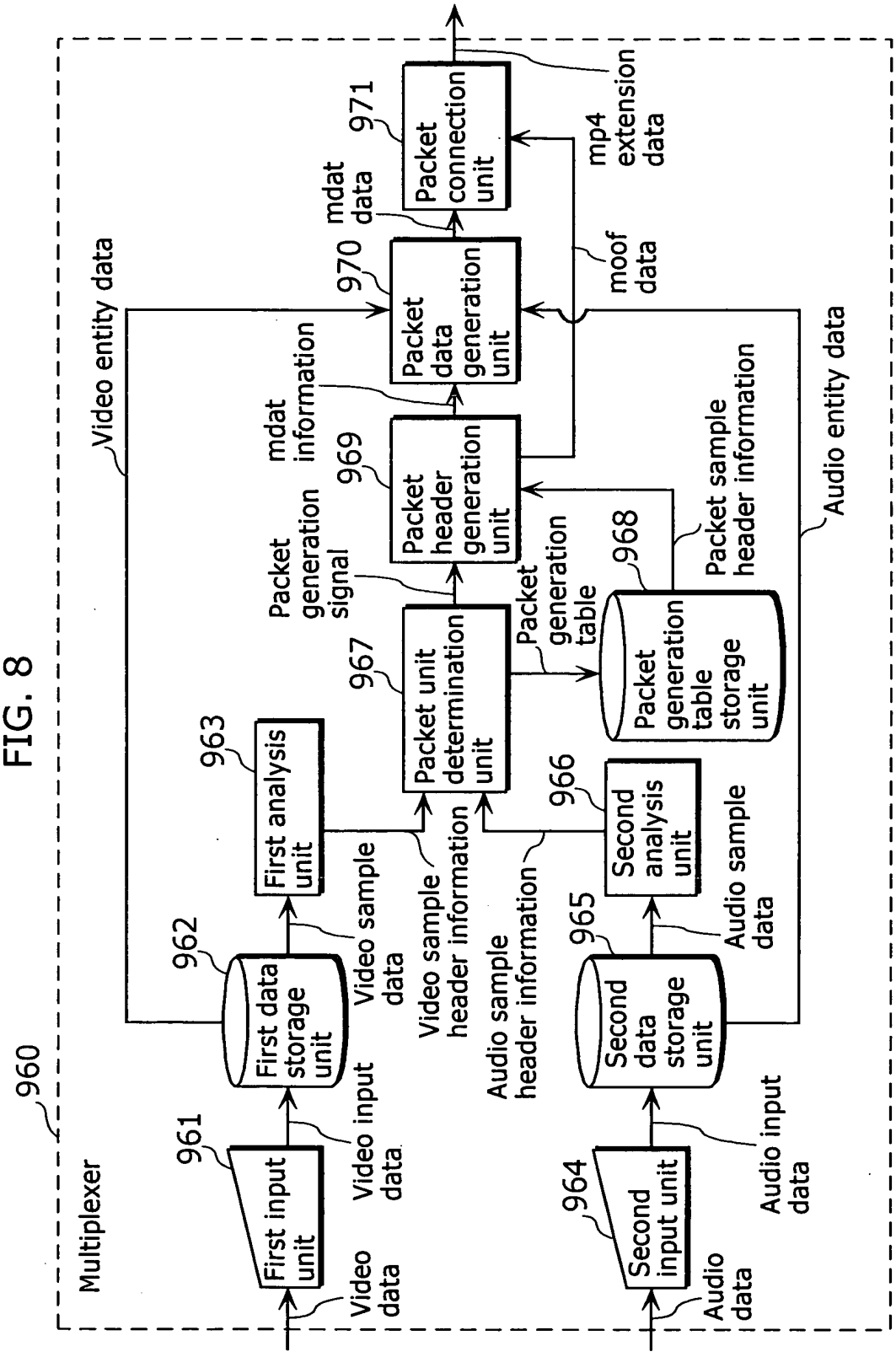

960
Multiplexer
961
First input unit
Video data
Video input data
962
First data storage unit
963
First analysis unit
Video sample data
Video sample header information
964
Second input unit
Audio data
Audio input data
965
Second data storage unit
966
Second analysis unit
Audio sample data
Audio sample header information
967
Packet unit determination unit
Packet generation signal
968
Packet generation table storage unit
Packet generation table
969
Packet header generation unit
mdat information
970
Packet data generation unit
mdat data
971
Packet connection unit
mp4 extension data
moof data
Video entity data
Audio entity data
Packet sample header information

FIG. 9

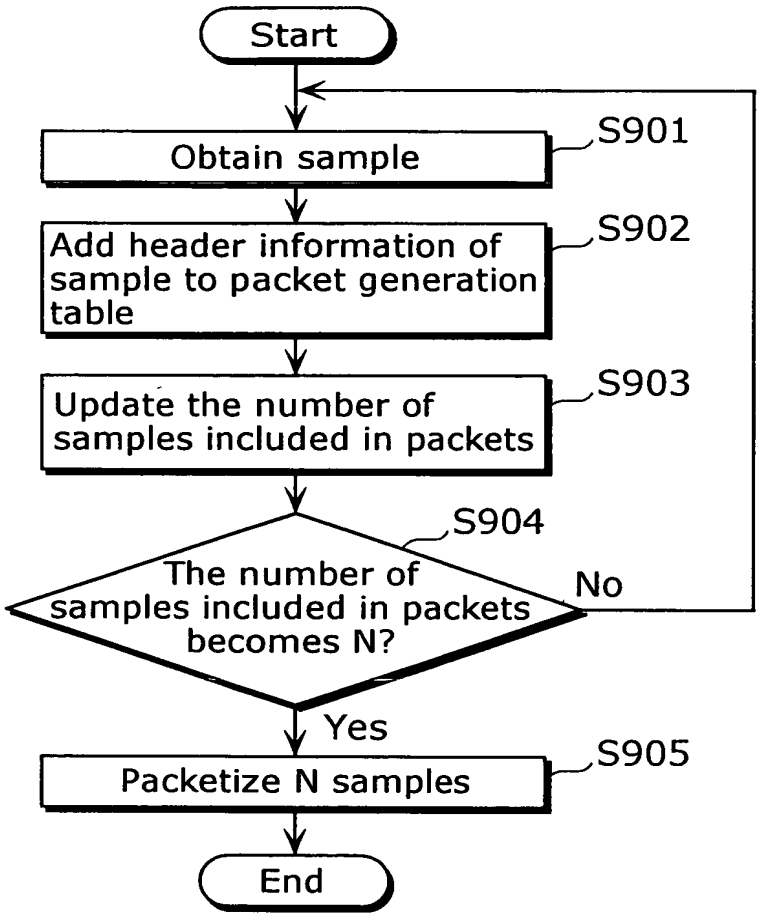

Start
Obtain sample
S901
Add header information of sample to packet generation table
S902
Update the number of samples included in packets
S903
S904
The number of samples included in packets becomes N?
No
Yes
Packetize N samples
S905
End

FIG. 10

968a

Sample size	Sample playback duration	Intra picture coded frame flag	
300	30	0	Sample 1
300	30	1	Sample 2
⋮	⋮	⋮	
300	30	0	Sample N

FIG. 11A

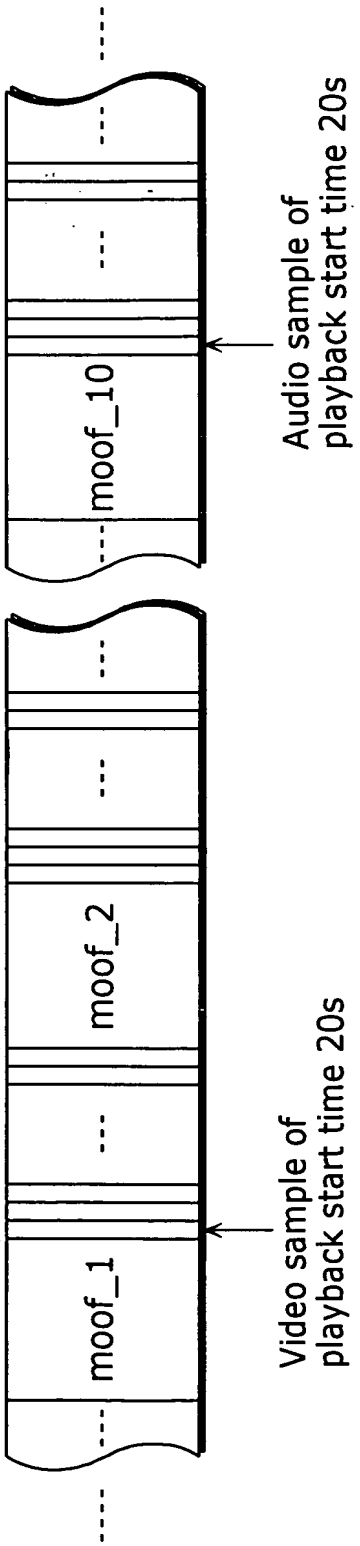


FIG. 11B

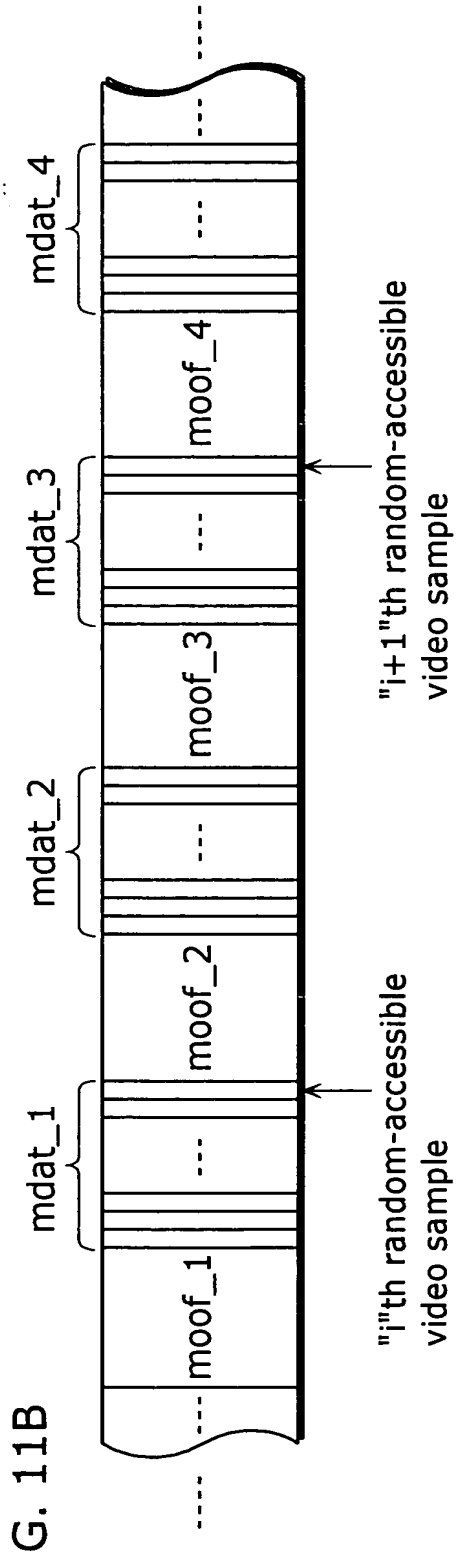


FIG. 12

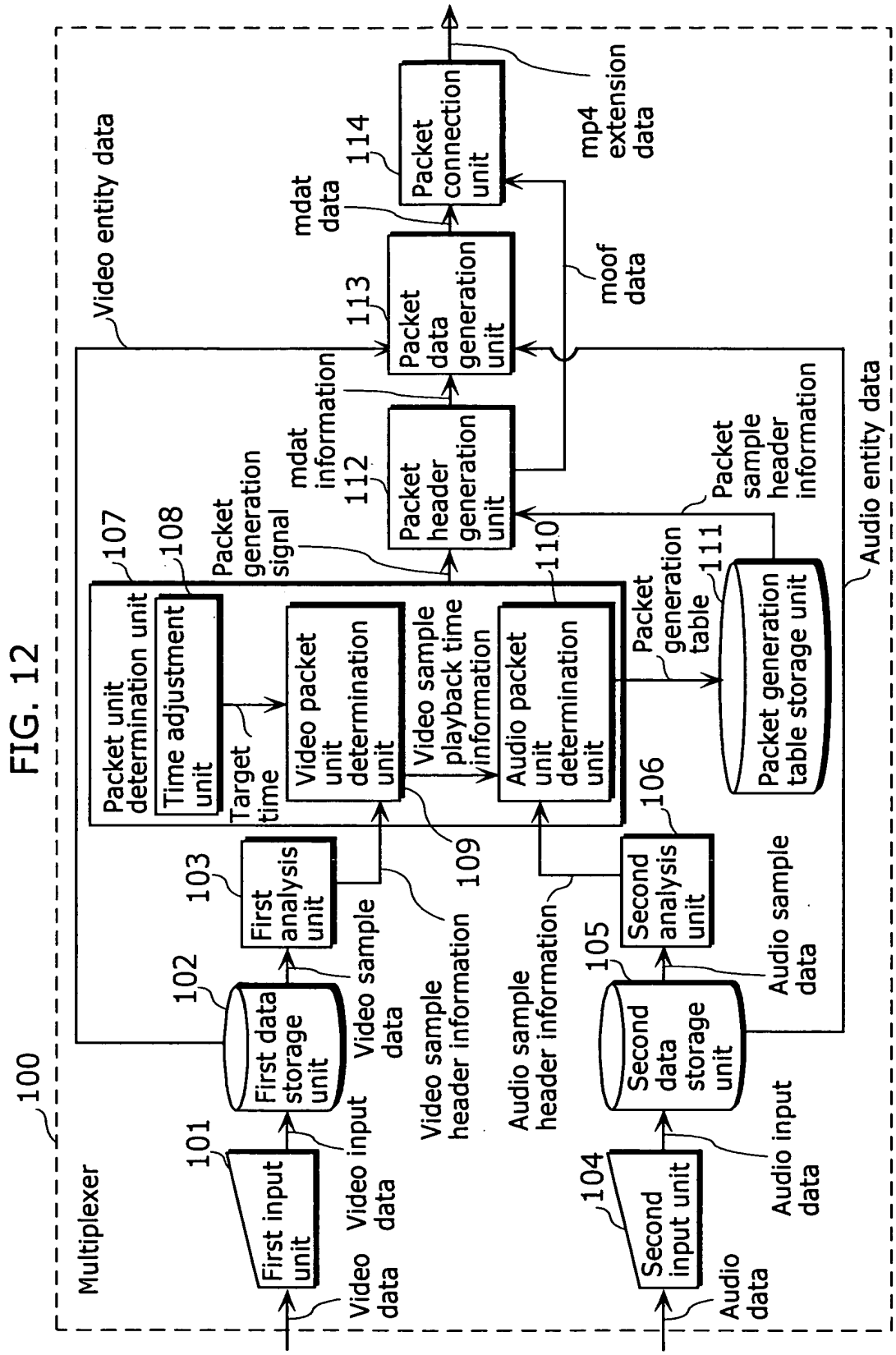

100
Multiplexer
101
First input unit
Video data
Video input data
102
First data storage unit
Video sample data
103
First analysis unit
Video sample header information
104
Second input unit
Audio data
Audio input data
105
Second data storage unit
Audio sample data
106
Second analysis unit
Audio sample header information
107
Packet unit determination unit
108
Time adjustment unit
Target time
109
Video packet unit determination unit
Video sample playback time information
110
Audio packet unit determination unit
111
Packet generation table
Packet generation table storage unit
112
Packet header generation unit
Packet generation signal
mdat information
Packet sample header information
113
Packet data generation unit
moof data
114
Packet connection unit
mdat data
mp4 extension data
Video entity data
Audio entity data

FIG. 13

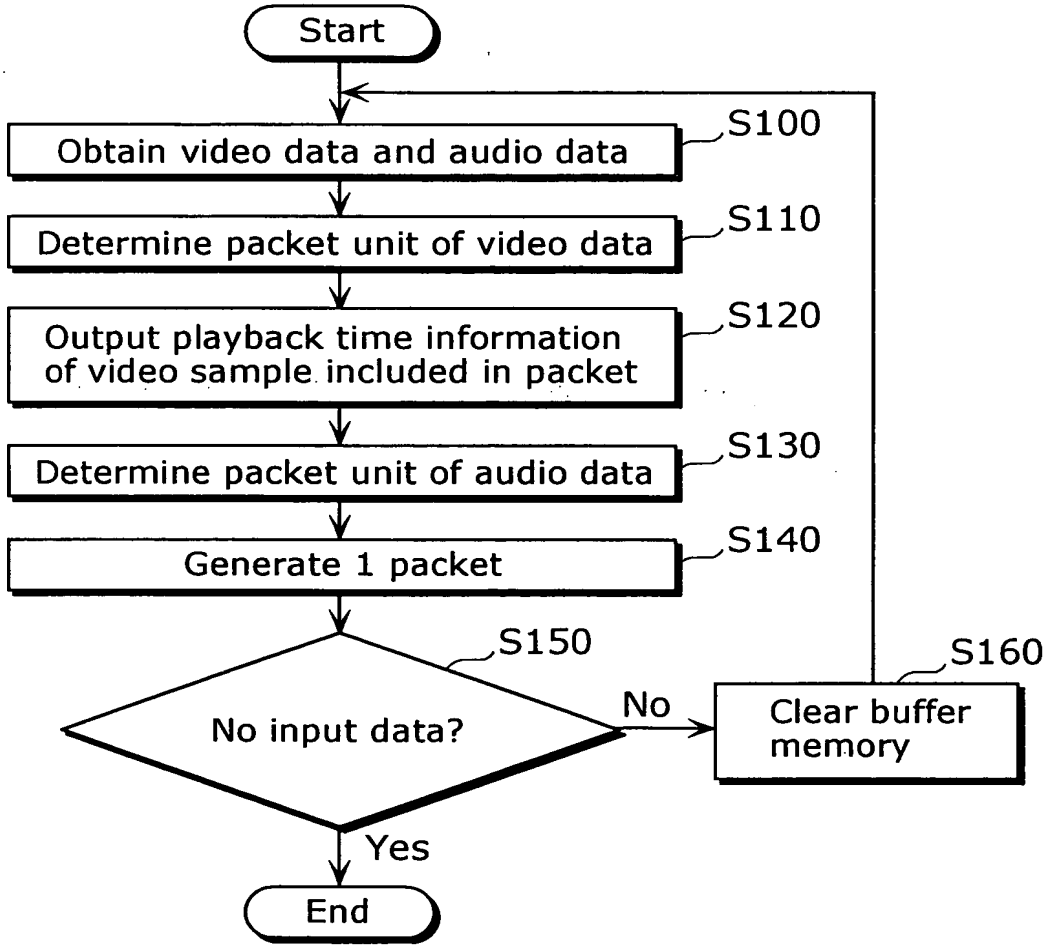

Start
Obtain video data and audio data
S100
Determine packet unit of video data
S110
Output playback time information of video sample included in packet
S120
Determine packet unit of audio data
S130
Generate 1 packet
S140
No input data?
S150
No
Clear buffer memory
S160
Yes
End

FIG. 14

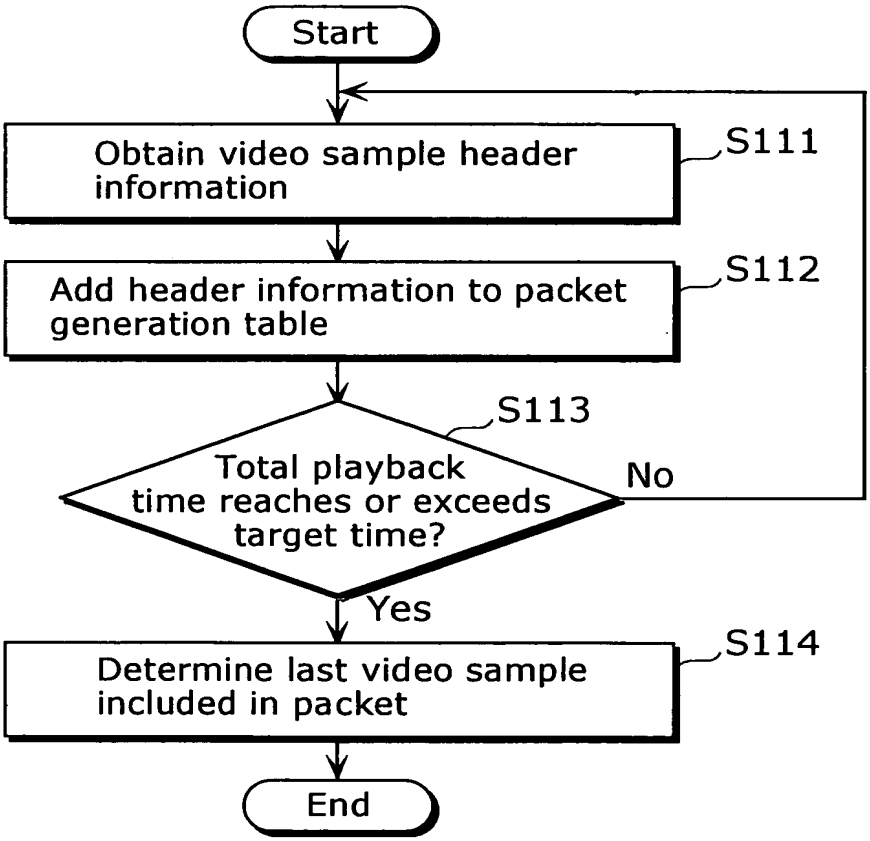
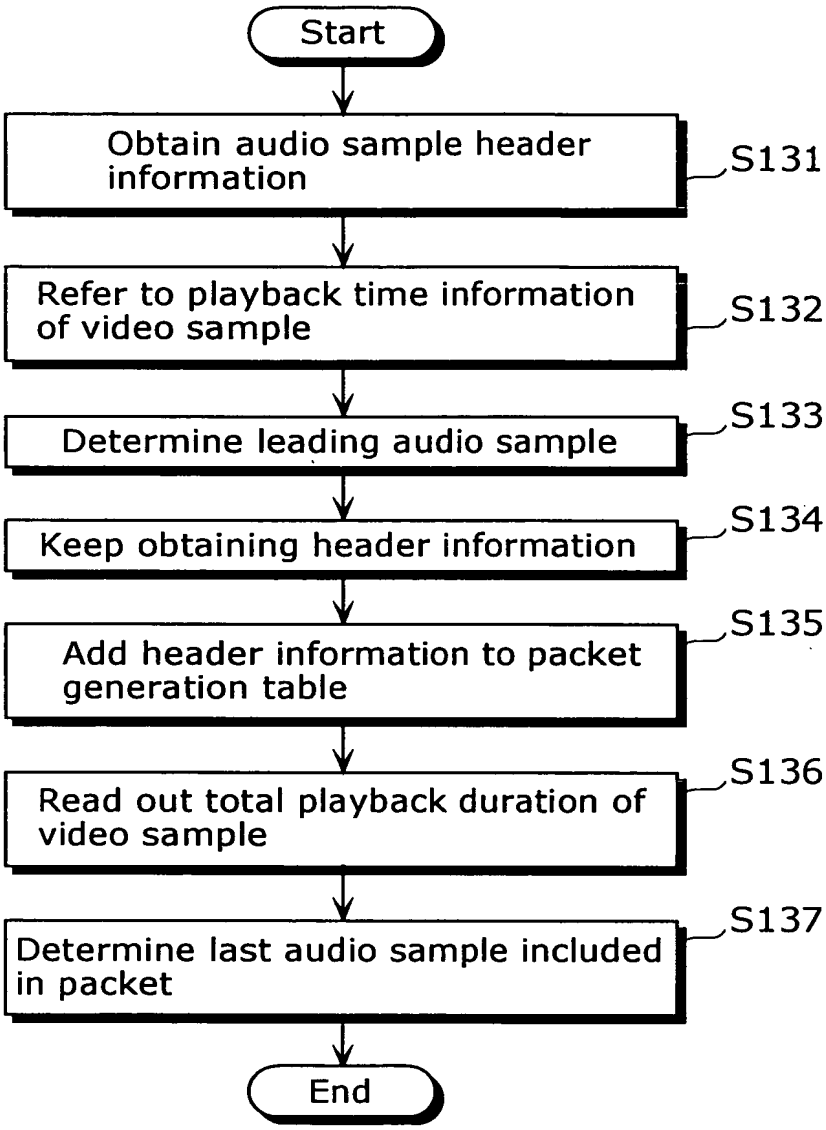

Start
Obtain video sample header information
S111
Add header information to packet generation table
S112
S113
Total playback time reaches or exceeds target time?
No
Yes
Determine last video sample included in packet
S114
End

FIG. 15


Start
Obtain audio sample header information
S131
Refer to playback time information of video sample
S132
Determine leading audio sample
S133
Keep obtaining header information
S134
Add header information to packet generation table
S135
Read out total playback duration of video sample
S136
Determine last audio sample included in packet
S137
End

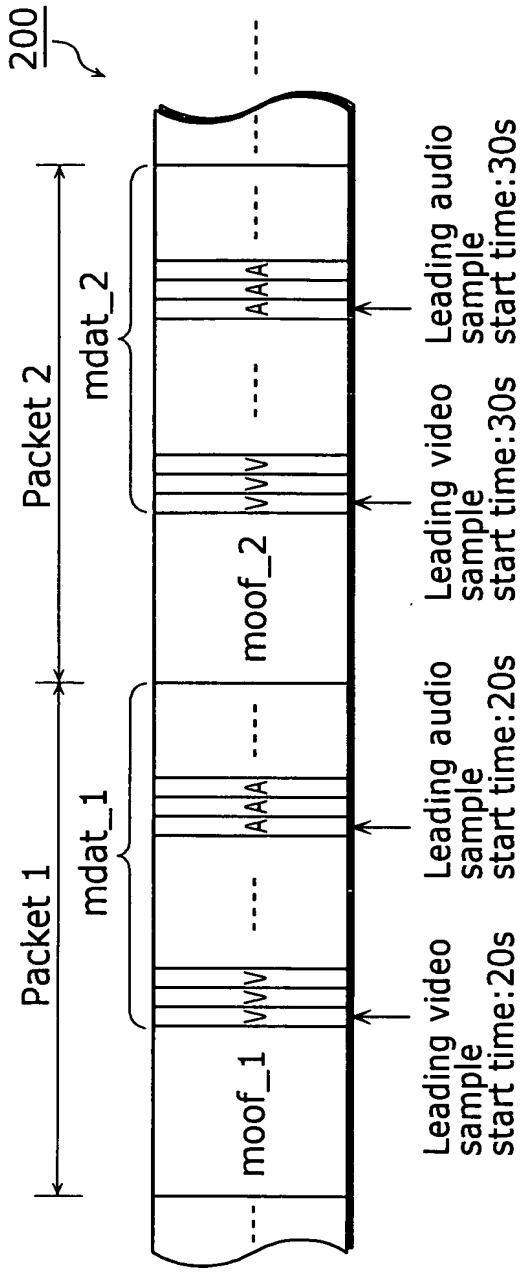


FIG. 16A

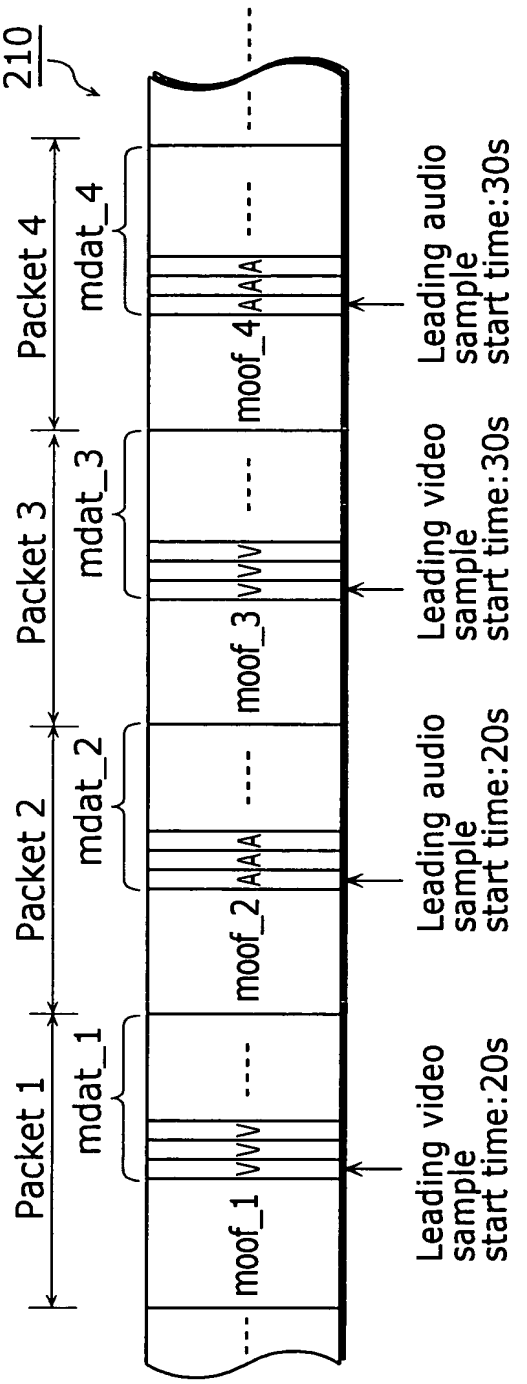


FIG. 16B

FIG. 17

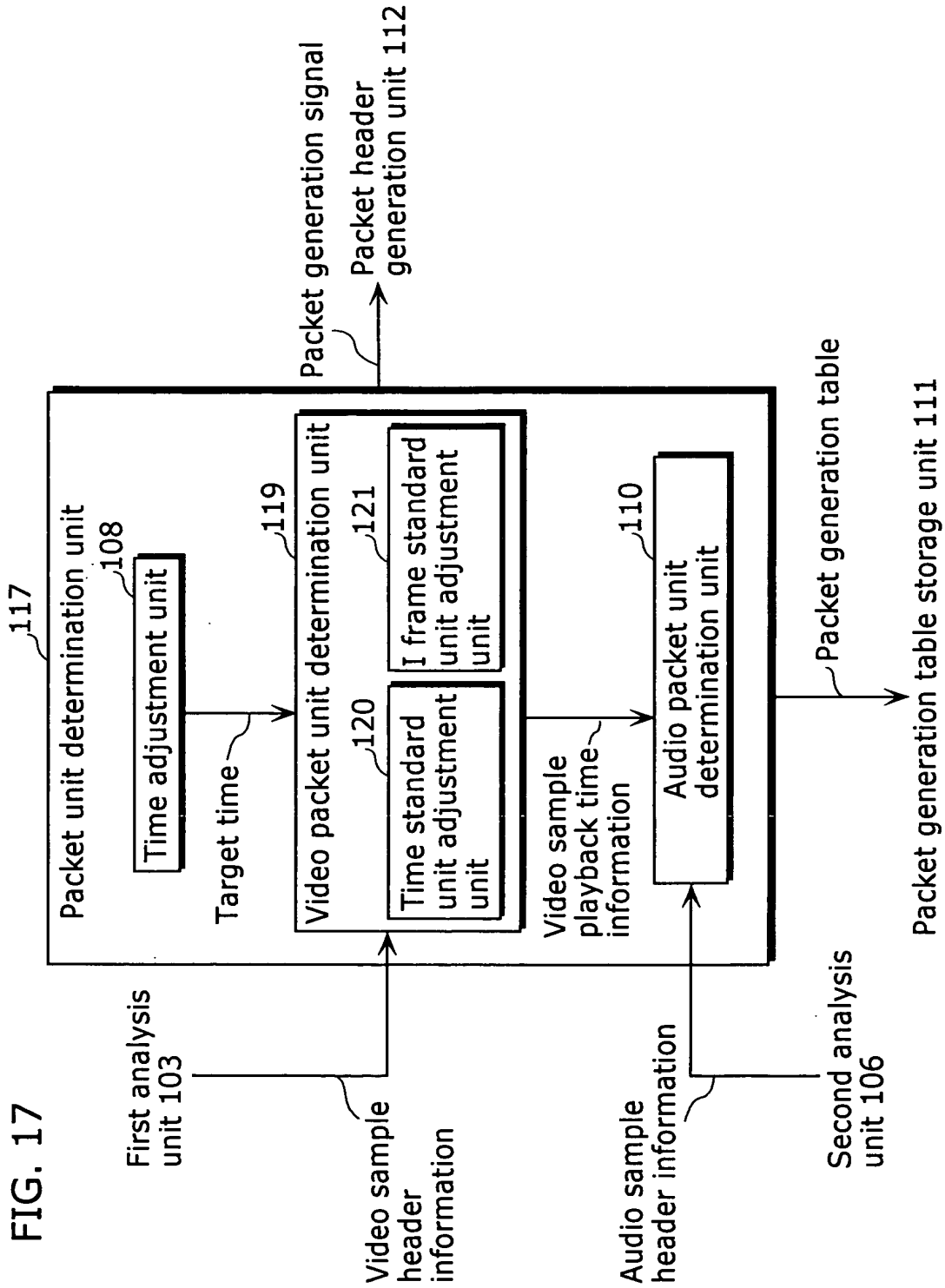

Packet generation signal
Packet header generation unit 112
117
Packet unit determination unit
108
Time adjustment unit
Target time
119
Video packet unit determination unit
120
Time standard unit adjustment unit
121
I frame standard unit adjustment unit
Video sample playback time information
110
Audio packet unit determination unit
Packet generation table
Packet generation table storage unit 111
First analysis unit 103
Video sample header information
Audio sample header information
Second analysis unit 106

FIG. 18

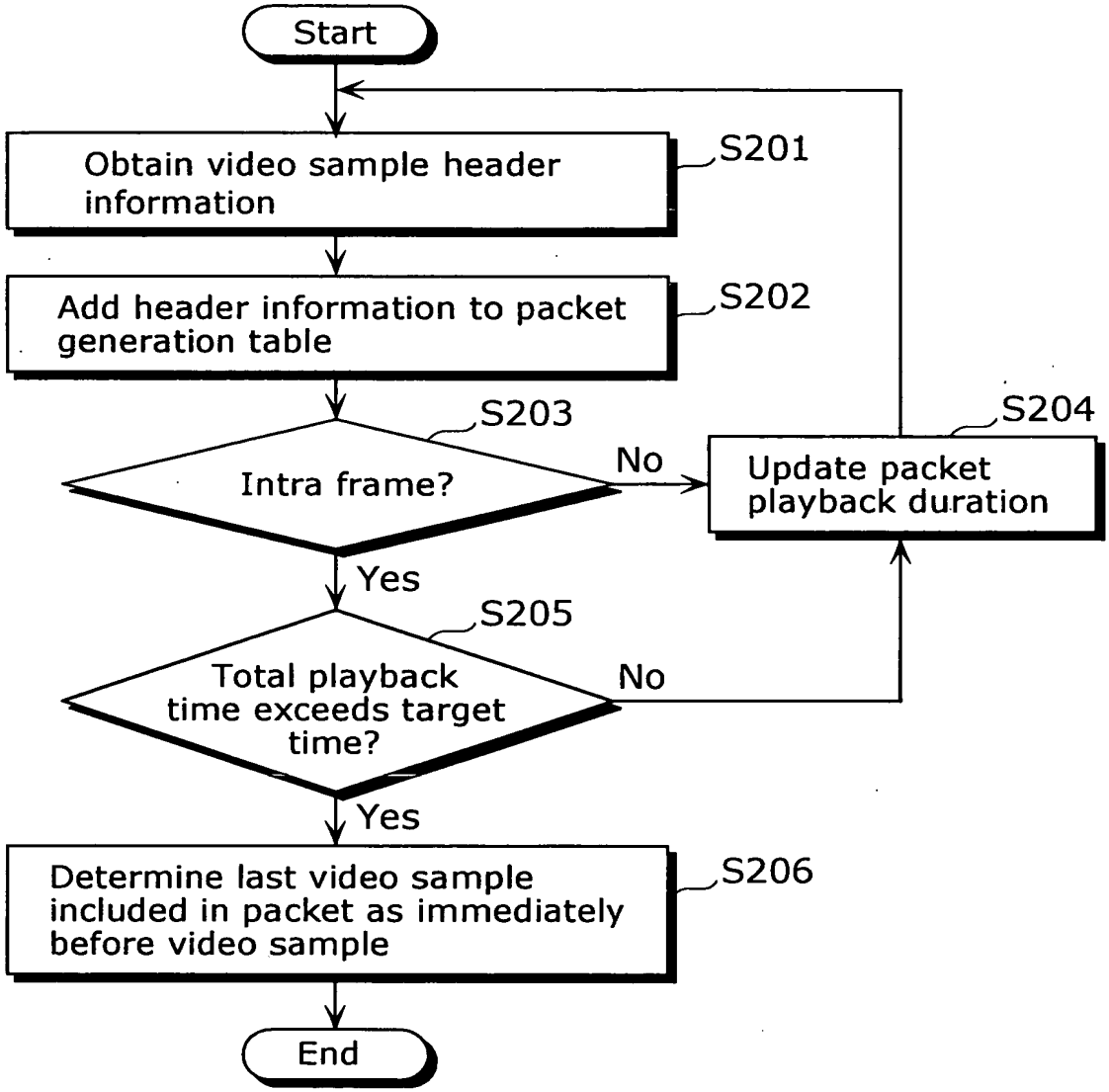
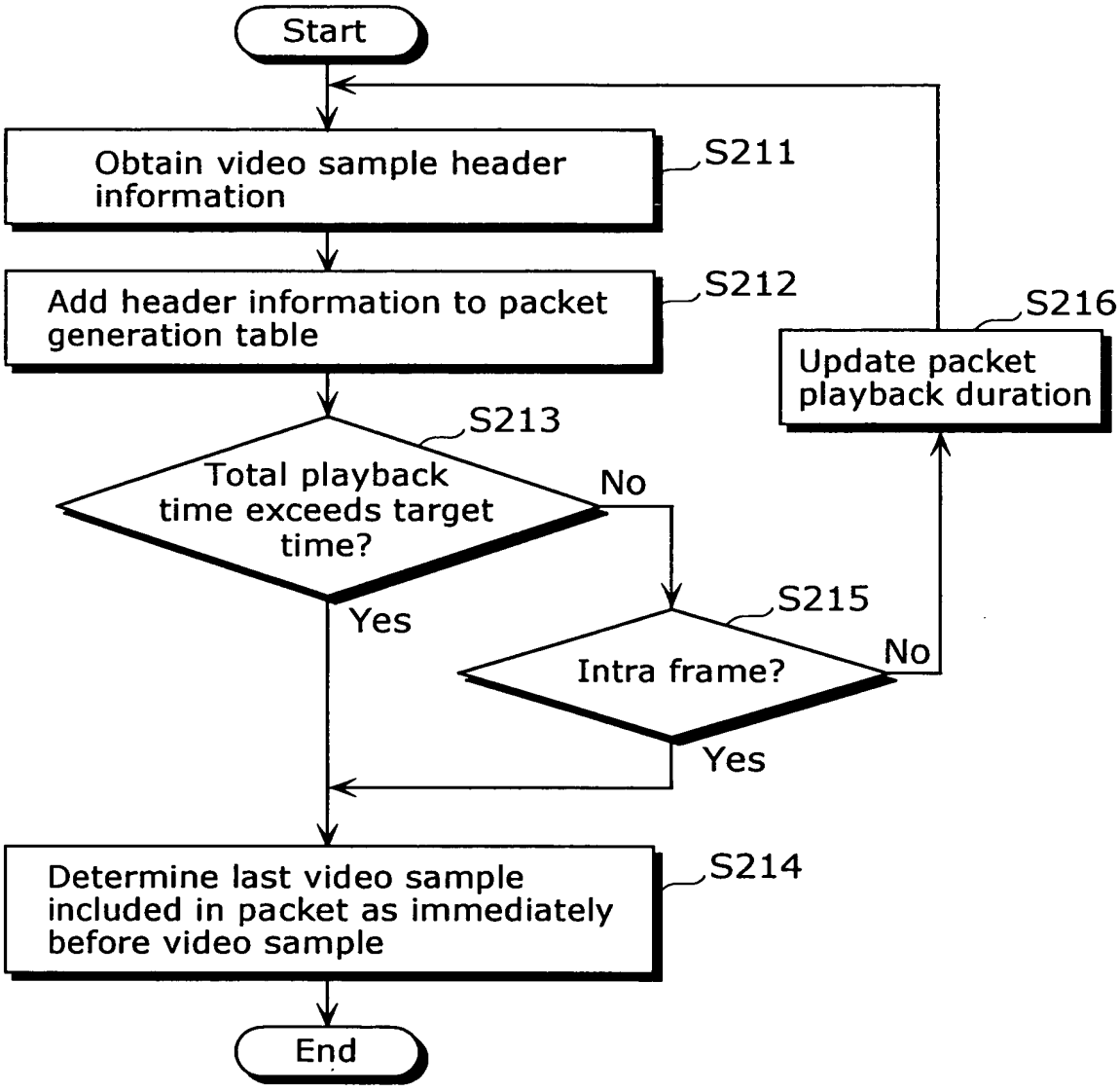

Start
Obtain video sample header information
S201
Add header information to packet generation table
S202
S203
Intra frame?
No
S204
Update packet playback duration
Yes
S205
Total playback time exceeds target time?
No
Yes
Determine last video sample included in packet as immediately before video sample
S206
End

FIG. 19


Start
Obtain video sample header information
S211
Add header information to packet generation table
S212
S213
Total playback time exceeds target time?
No
Yes
S215
Intra frame?
No
Yes
S216
Update packet playback duration
Determine last video sample included in packet as immediately before video sample
S214
End

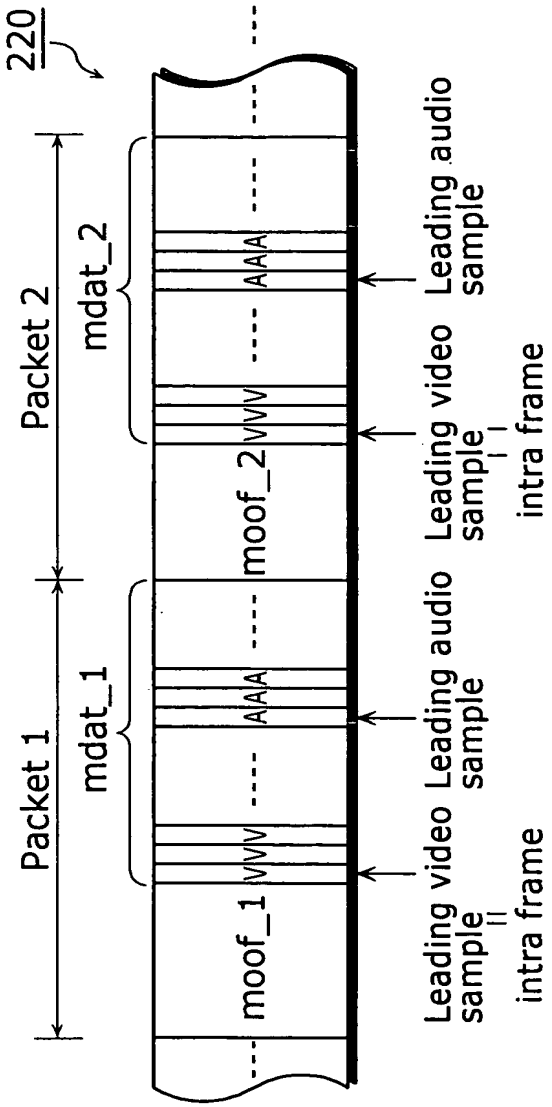


FIG. 20A

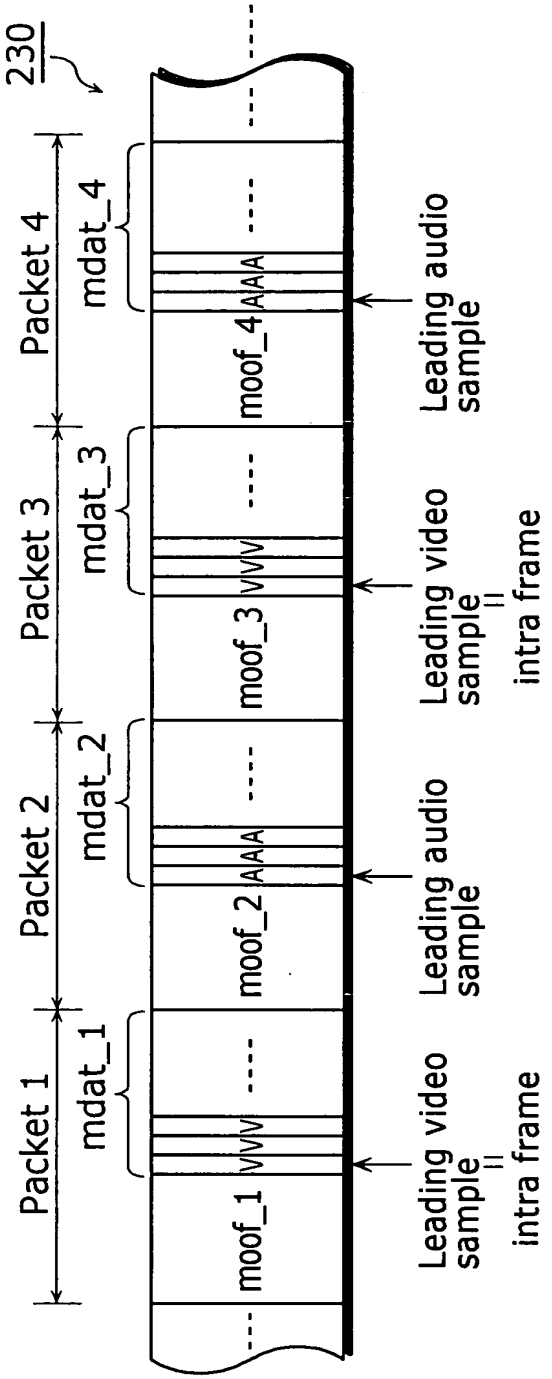


FIG. 20B

FIG. 21

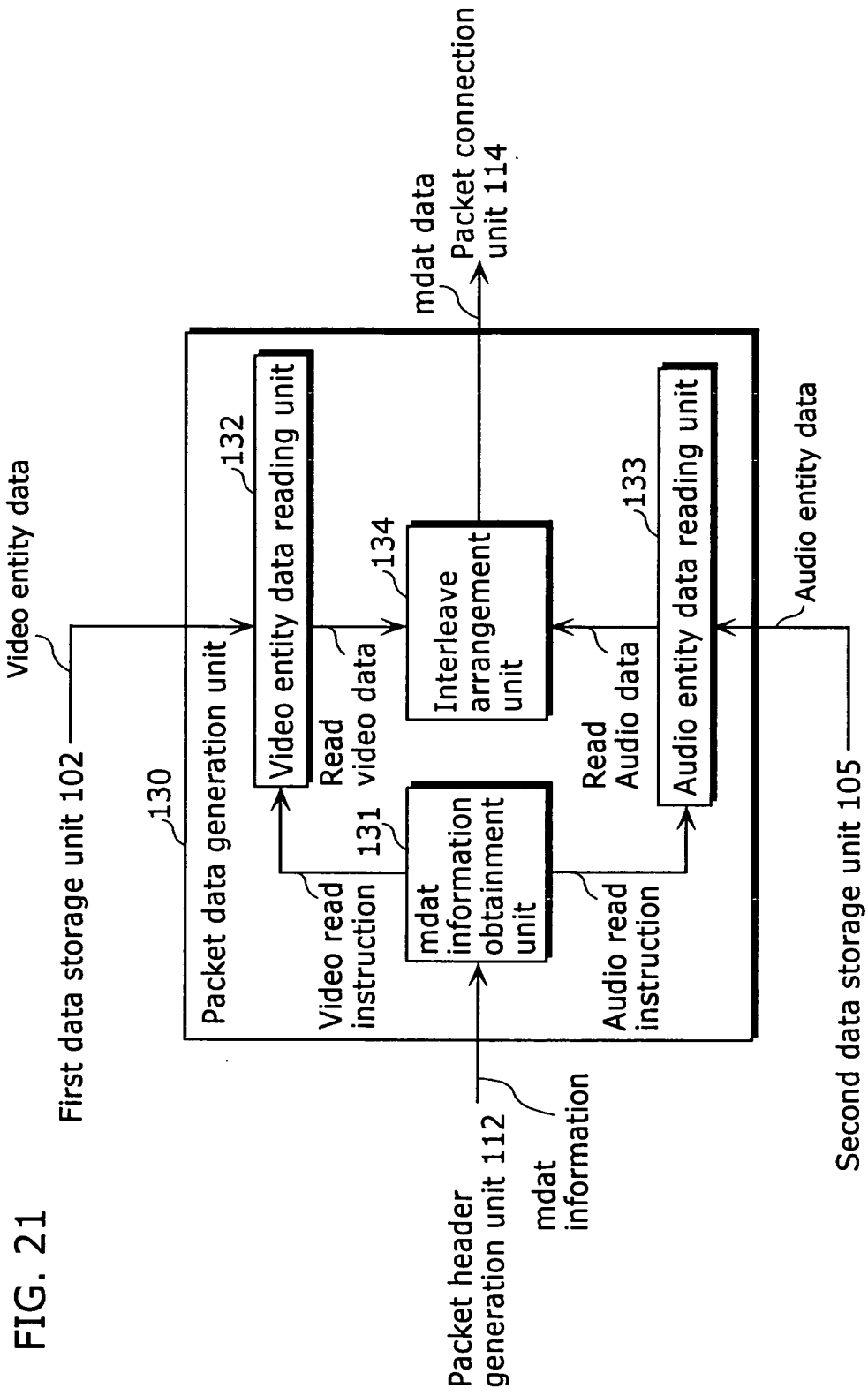

First data storage unit 102
Video entity data
Packet header generation unit 112
mdat information
Second data storage unit 105
Audio entity data
Packet data generation unit
130
Video entity data reading unit
132
Audio entity data reading unit
133
mdat information obtainment unit
131
Interleave arrangement unit
134
Packet connection unit 114
mdat data
Read video data
Video read instruction
Read Audio data
Audio read instruction

FIG. 22

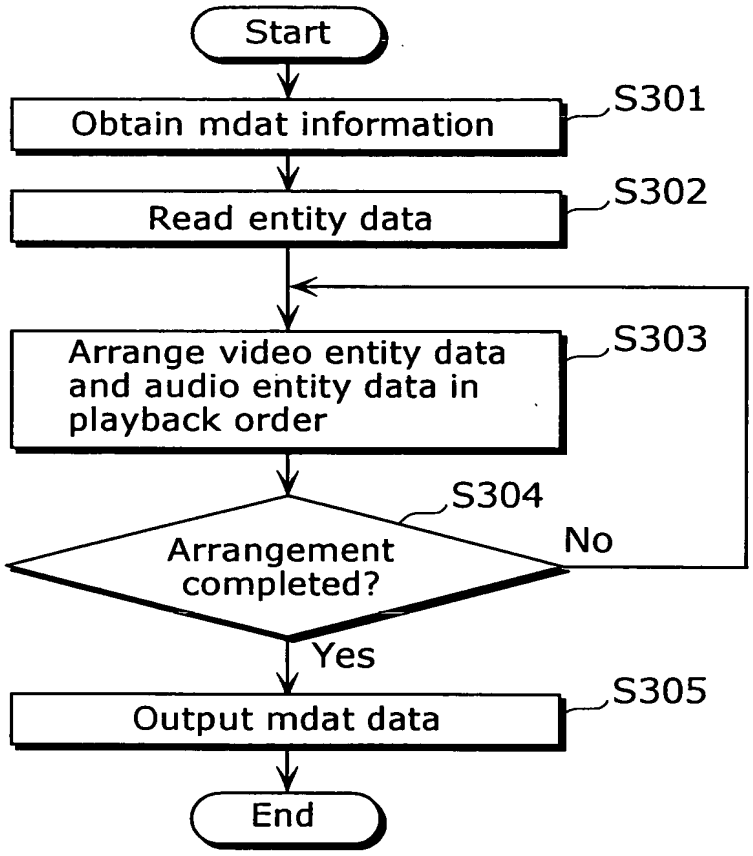

Start
Obtain mdat information
S301
Read entity data
S302
Arrange video entity data and audio entity data in playback order
S303
Arrangement completed?
S304
No
Yes
Output mdat data
S305
End

FIG. 23

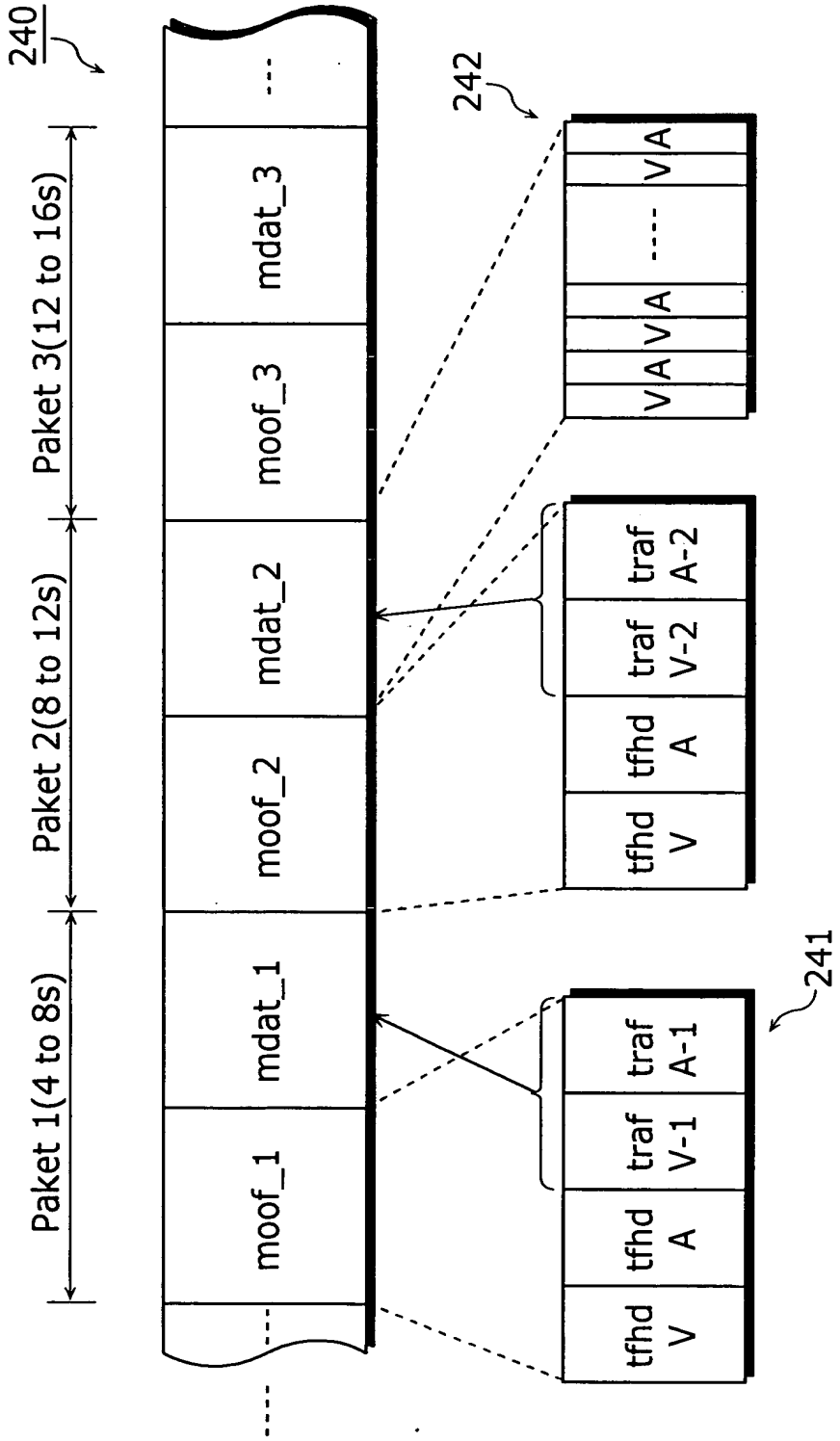
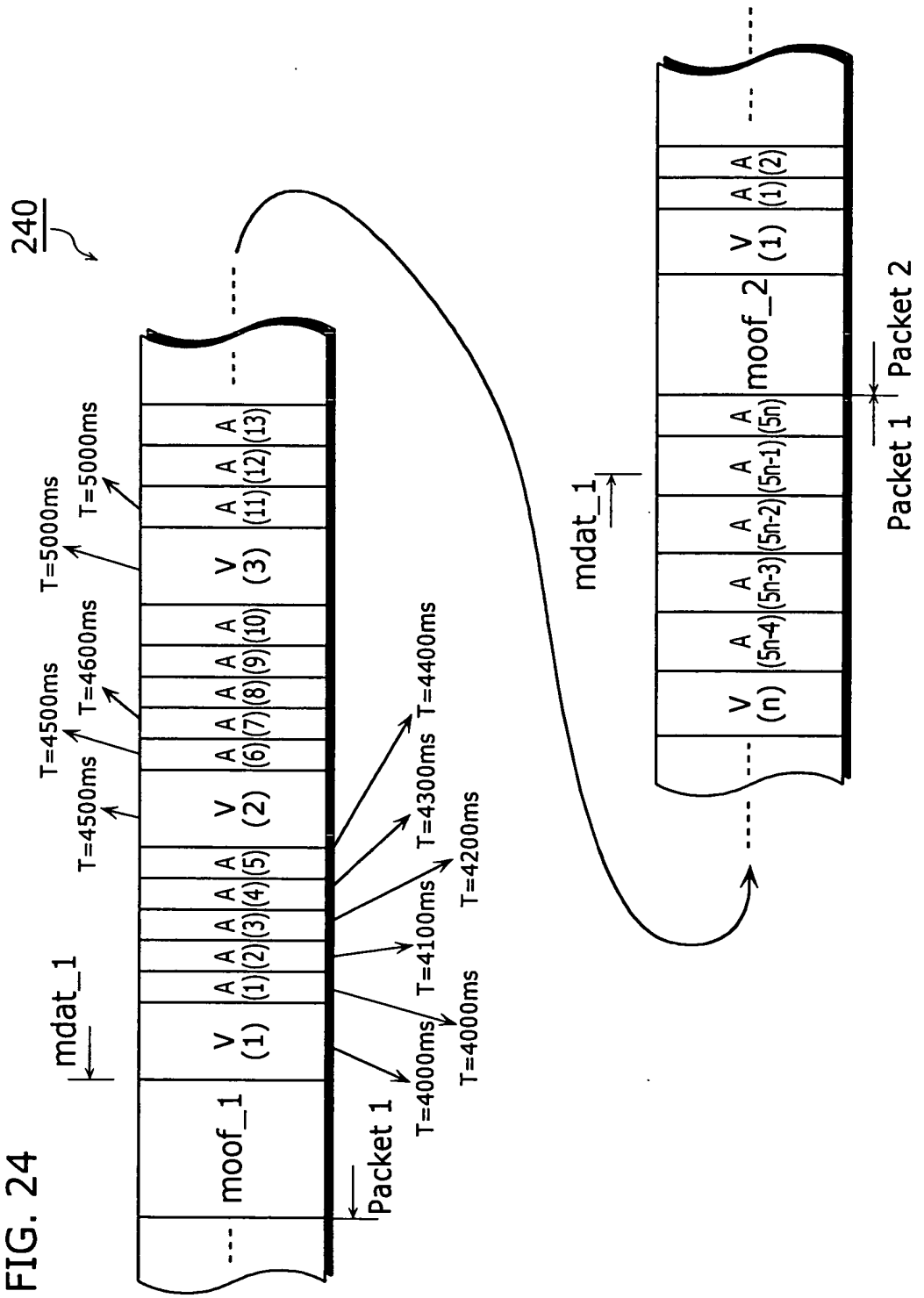

240
Paket 1(4 to 8s)
Paket 2(8 to 12s)
Paket 3(12 to 16s)
moof_1
mdat_1
moof_2
mdat_2
moof_3
mdat_3
241
tfhd V
tfhd A
traf V-1
traf A-1
242
tfhd V
tfhd A
traf V-2
traf A-2
V A V A ---- V A

FIG. 24


240
mdat_1
moof_1
V (1)
A (1)
A (2)
A (3)
A (4)
A (5)
V (2)
A (6)
A (7)
A (8)
A (9)
A (10)
V (3)
A (11)
A (12)
A (13)
Packet 1
T=4000ms
T=4100ms
T=4200ms
T=4300ms
T=4400ms
T=4500ms
T=4500ms
T=4600ms
T=5000ms
T=5000ms
mdat_1
moof_2
V (n)
A (5n-4)
A (5n-3)
A (5n-2)
A (5n-1)
A (5n)
V (1)
A (1)
A (2)
Packet 1
Packet 2

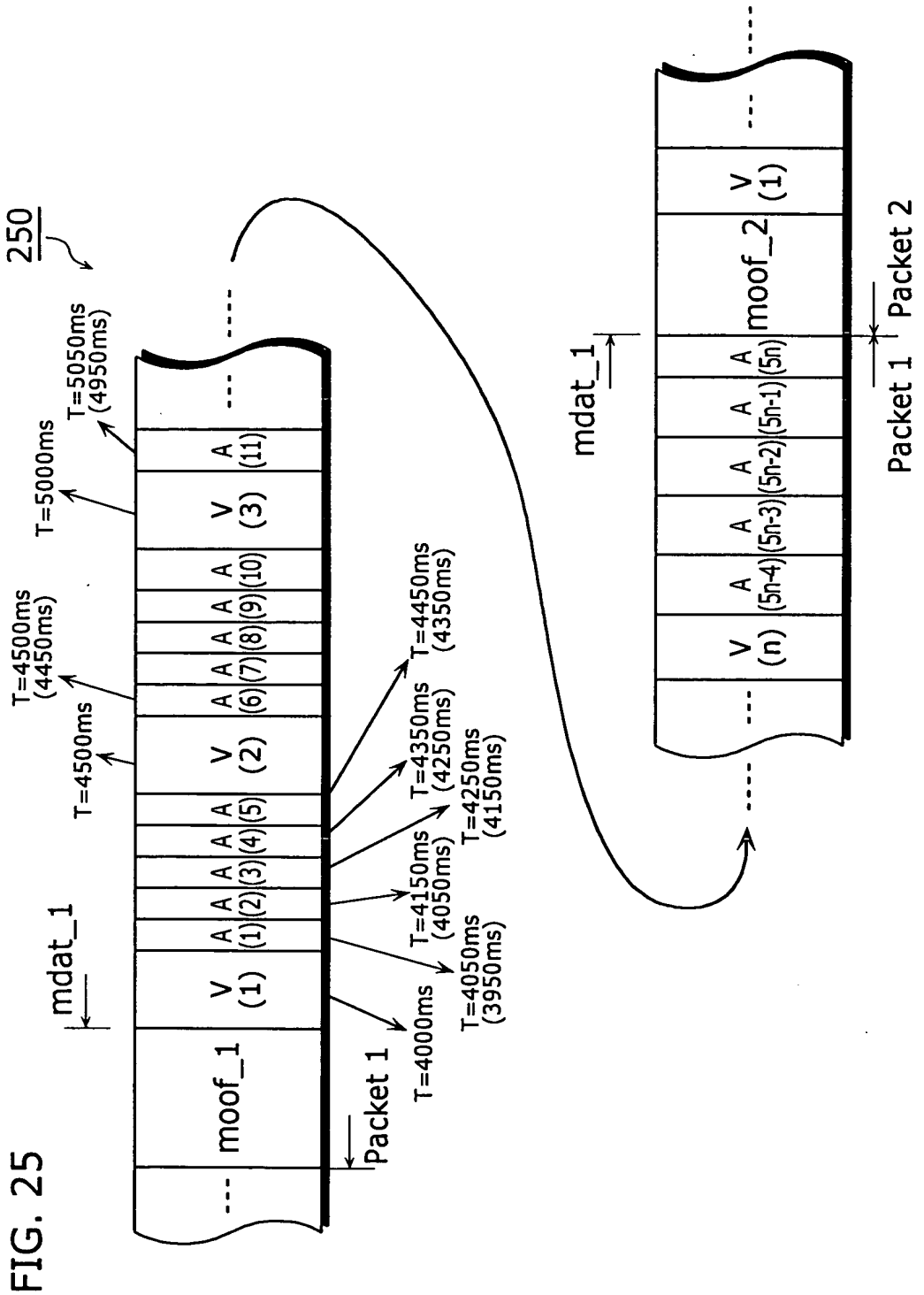

250
T=5050ms
(4950ms)
T=5000ms
T=4500ms
(4450ms)
T=4500ms
T=4450ms
(4350ms)
T=4350ms
(4250ms)
T=4250ms
(4150ms)
T=4150ms
(4050ms)
T=4050ms
(3950ms)
T=4000ms
mdat_1
moof_1
V (1)
A (1)
A (2)
A (3)
A (4)
A (5)
V (2)
A (6)
A (7)
A (8)
A (9)
A (10)
V (3)
A (11)
Packet 1
mdat_1
moof_2
V (n)
A (5n-4)
A (5n-3)
A (5n-2)
A (5n-1)
A (5n)
V (1)
Packet 1
Packet 2

FIG. 25

FIG. 26

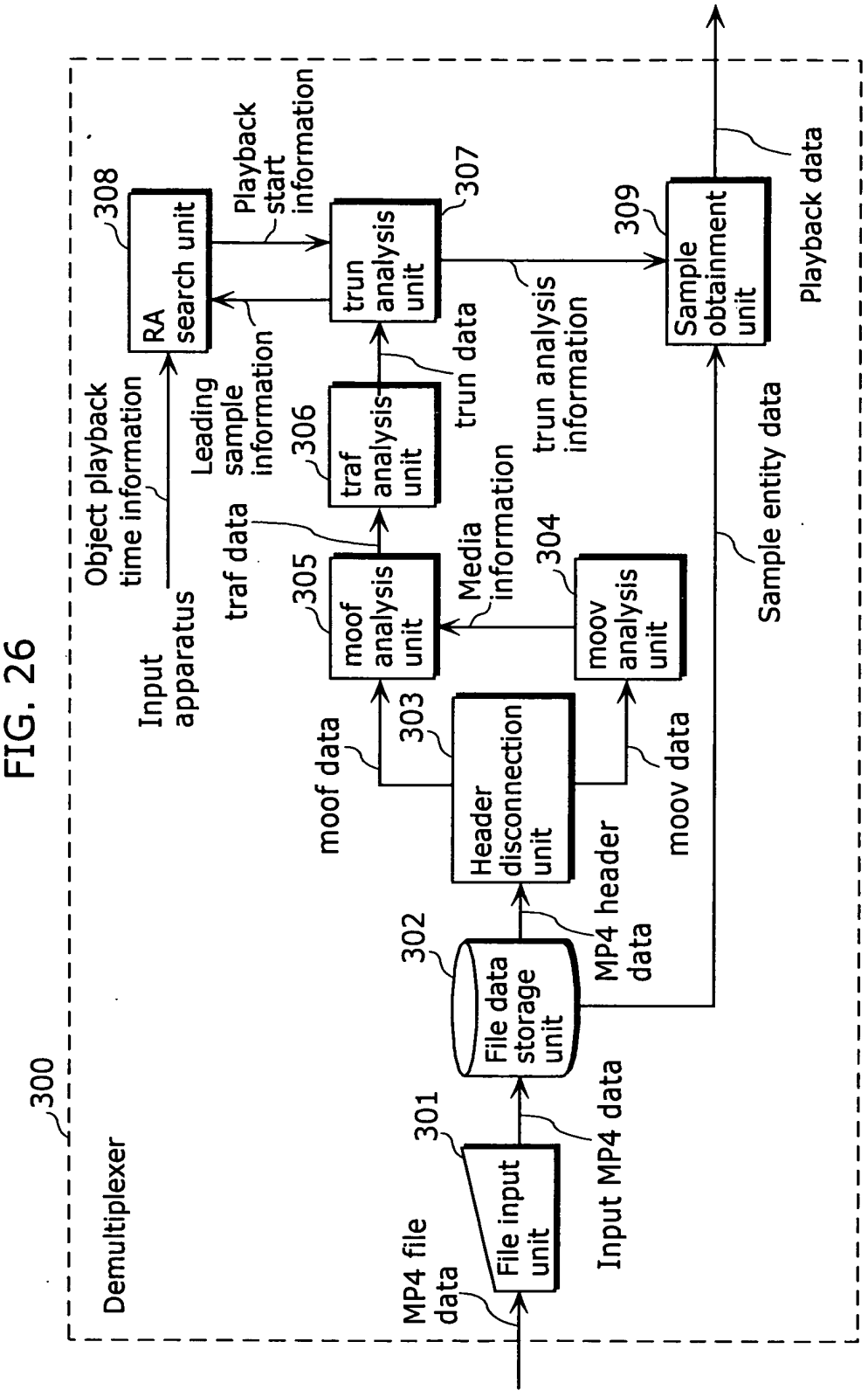
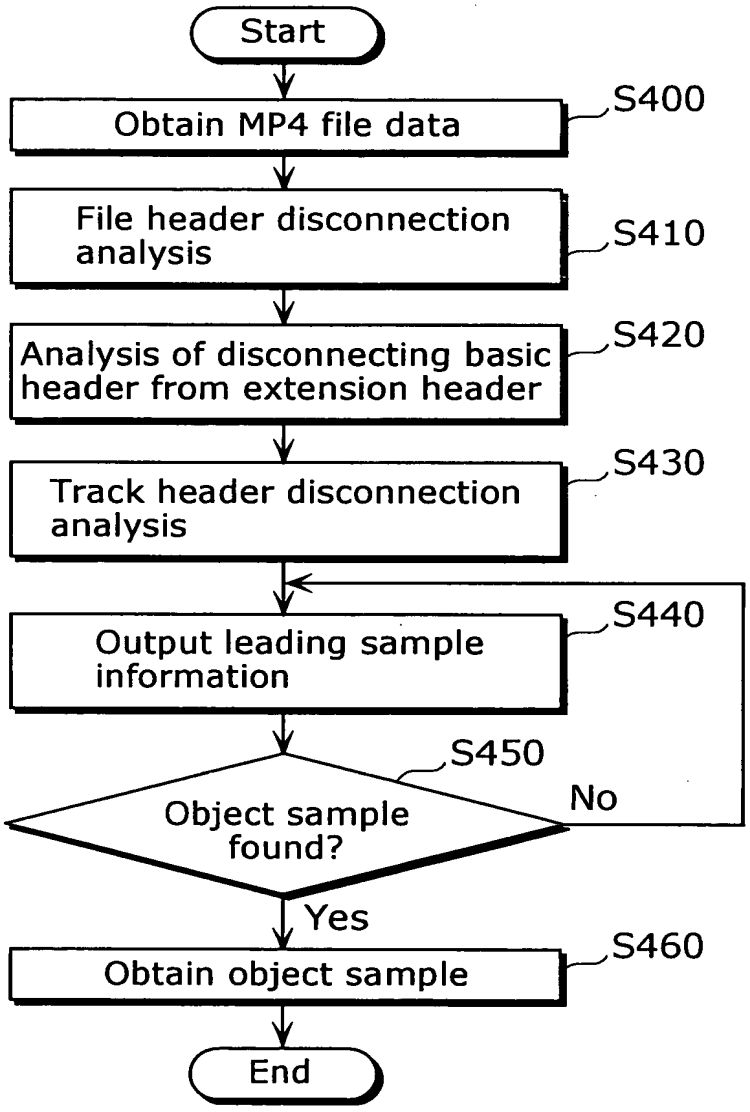

Demultiplexer
300
MP4 file data
File input unit
301
Input MP4 data
File data storage unit
302
MP4 header data
Header disconnection unit
303
moof data
moov data
moof analysis unit
305
moov analysis unit
304
Media information
traf analysis unit
306
traf data
trun data
trun analysis unit
307
RA search unit
308
Object playback time information
Leading sample information
Playback start information
Input apparatus
Sample obtainment unit
309
Sample entity data
Playback data

FIG. 27


Start
Obtain MP4 file data
S400
File header disconnection analysis
S410
Analysis of disconnecting basic header from extension header
S420
Track header disconnection analysis
S430
Output leading sample information
S440
Object sample found?
S450
No
Yes
Obtain object sample
S460
End

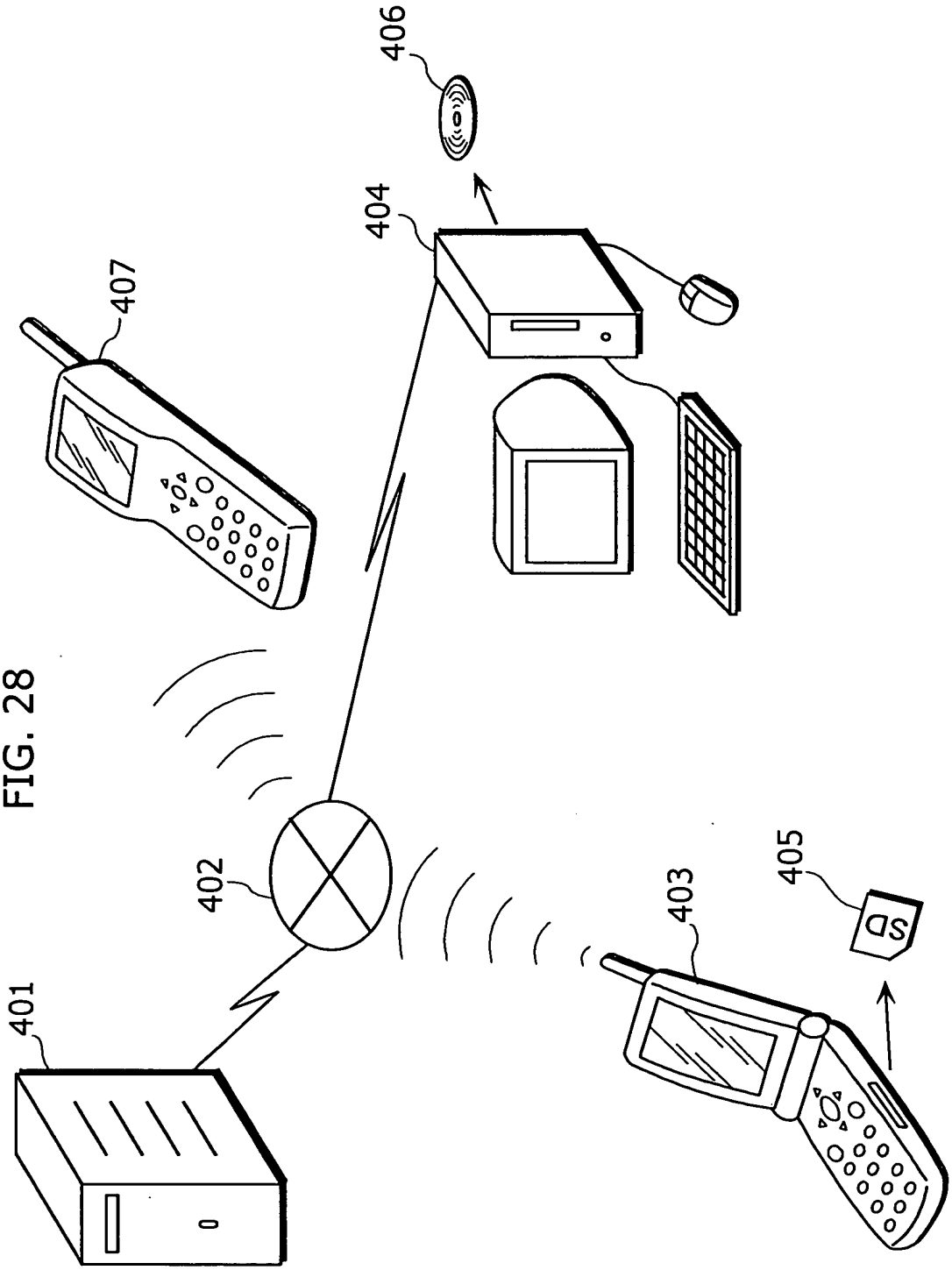


FIG. 28